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Report On

Emergency Beacons Limited Testing of the
SRT Marine Technology Ltd
Cobalt - Class B AIS

Document 75912008 Report 05 Issue 1 April 2011

Product Service

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REPORT ON

Emergency Beacons Limited Testing of the
SRT Marine Technology Ltd
Cobalt - Class B AIS

Document 75912008 Report 05 Issue 1

April 2011

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DATED 01 April 2011

Product Service

CONTENTS

Product Service

SECTION 1

REPORT SUMMARY

Emergency Beacons Limited Testing of the
SRT Marine Technology Ltd
Cobalt - Class B AIS

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Emergency Beacons Testing of the SRT Marine Technology Ltd Cobalt - Class B AIS to the requirements of IEC 62287-1.

Objective	To perform GPS Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	SRT Marine Technology Ltd
Model Number(s)	Cobalt - Class B AIS
Serial Number(s)	Not Serialised (TSR0024)
Number of Samples Tested	One
Test Specification/Issue/Date	IEC 62287-1: 2010
Order Number Date	PO001715 02 December 2010
Start of Test	14 February 2011
Finish of Test	30 March 2011
Name of Engineer(s)	R Hampton
Related Documents	IEC 61108-1: 2003 EN 61162-1: 2008

1.2 DECLARATION OF BUILD STATUS/APPLICATION FORM

EQUIPMENT DESCRIPTION	
Model Name/Number	COBALT
Part Number	011-0014
Technical Description (Please provide a brief description of the intended use of the equipment)	Marine AIS CSTDMA Class B Transceiver to IEC62287-1

TYPE OF EQUIPMENT		
☐	Base Station	(Equipment fitted with an antenna socket for use with an external antenna, and intended for use in a fixed location).
☒	Mobile Station	(Mobile equipment fitted with an antenna socket, for use with an external antenna, normally used in a vehicle or as a transportable station).
☐	Hand Portable	(fitted with an antenna socket)
☐	Hand Portable	(without an external antenna socket integral antenna equipment, but fitted with a permanent internal or a temporary internal 50 ohm R.F. connector which allows access to the transmitter output and the receiver input)
☐	Other	

TYPE OF EQUIPMENT					
Base Station	☐	Mobile Station	☒	Hand Portable	☐
☐ Transmitter			☐ Simplex		
☐ Receiver			☒ Duplex		
☒ Transceiver			☐ Communal Site use (70dB limit)		

TRANSMITTER TECHNICAL CHARACTERISTICS		
FREQUENCY CHARACTERISTICS		
Transmitter channel switching frequency range:	156.025 to 162.025	MHz (MHz Range)
Transmitter frequency alignment range:	156.0 to 162.0	MHz (MHz Range)

TRANSMITTER POWER CHARACTERSITICS								
Is transmitter intended for :								
Continuous duty						☐	Yes	☒ No
Intermittent duty only						☒	Yes	☐ No
If intermittent duty state DUTY CYCLE								
Transmitter ON	0.0267	Seconds		Transmitter OFF	30	Seconds		
Is transmitter output power variable?						☒	Yes	☐ No
If yes								
RF output power (watts)	2	Maximum			2	Minimum		
Is the RF power								
continuously variable						☐	Yes	☒ No
Or								
stepped						☐	Yes	☒ No
If stepped						dB per step		

TRANSMITTER - MODULATION			
Amplitude	☐	Other	☐
Frequency	☐	Details :	
Phase	☒		
Can the transmitter be operated without modulation (See Note 1)		☒ Yes	☐ No

RECEIVER TECHNICAL CHARACTERISTICS		
Intermediate Frequencies		
☒ 1st	☒ 2nd	
☐ 3rd		
Is local oscillator injection frequency higher or lower than the receiver nominal frequency?		
☐ Higher	☒ Lower	
RECEIVER CHANNEL SWITCHING FREQUENCY RANGE	156.025 to 156.025	MHz (MHz Range)
RECEIVER FREQUENCY ALIGNMENT RANGE	156.0 to 162.0	MHz (MHz Range)

RECEIVER AUDIO (AF) CHARACTERISTICS						
MAXIMUM RATED AUDIO (AF) FREQUENCY OUTPUT POWER						
Into Loudspeaker	N/A	Watts				
Into Line	N/A	Watts				
Into Earpiece	N/A	Watts				
Balanced			☐	Yes	☐	No
Unbalanced			☐	Yes	☐	No
Does connection carry DC voltage?			☐	Yes	☐	No
If Yes, please state value:	N/A					
Normal Audio load impedance:						
At Loudspeaker	N/A	Ohms				
At Line	N/A	Ohms				
At Earpiece	N/A	Ohms				
At audio accessory connection or facility socket (if fitted):						
Output	N/A	Watts				
Impedance	N/A	Ohms				
Max input level at audio accessory socket:						
Output	N/A	mV				
Impedance	N/A	Ohms				

TRANSMITTER AND RECEIVER CHARACTERISTICS		
Channel Separation:	25	kHz
State the maximum number of channels over which the equipment can operate		240

EXTREME TEMPERATURE RANGE over which equipment is to be type tested
☐ -25°C to +55°C
☒ -15°C to +55°C
☐ -10°C to +55°C

POWER SOURCE			
☐	AC mains		State voltage
	AC supply frequency	(Hz)	
	VAC		
	Max Current		
	Hz		
☐	Single phase		☐ Three phase
And / Or			
☒	External DC supply		
	Nominal voltage	12V V	Max Current 1A A
	Extreme upper voltage	31.2 V	
	Extreme lower voltage	10.8 V	
Battery			
☐	Nickel Cadmium		☐ Lead acid (Vehicle regulated)
☐	Alkaline		☐ Leclanche
☐	Lithium		☐ Other Details :
	Volts nominal.		
End point voltage as quoted by equipment manufacturer			V

AUTOMATIC EQUIPMENT SWITCH OFF	
If the equipment is designed to automatically switch off at a predetermined voltage level which is higher or lower in value than the battery minimum and minimum calculated values this shall be clearly stated.	
☐ Applies	V cut-off voltage
☒ Does not apply	

ALIGNMENT RANGE			
The definition of the alignment range AR1 and AR2 are given in Sub Clauses 3.1.2 and 3.1.3 of the Standard. The applicant should ensure that the sample equipment(s) submitted are operational on the appropriate channel(s) as given in Sub Clauses 3.1.5 through to 3.1.11 and tick the appropriate box.			
	3.1.5	One sample single channel equipment of category AR1	☐
Or	3.1.6	Three samples of single channel equipments of category AR2	☐
Or	3.1.7	One sample two channel equipment of category AR1	☐
Or	3.1.8	Three samples of two channel equipment of category AR2	☐
Or	3.1.9	One sample multichannel equipment of category AR1	☐
Or	3.1.10	Three samples of multichannel equipment of category AR2	☐
Or	3.1.11	One sample of multichannel equipment of category AR2 where the switching range equals the alignment range	☐

CHANNEL IDENTIFICATION			
Each equipment, whether one or more submitted for tests shall carry clear identification (such as a serial number), together with the frequencies associated with the channel identification displayed on the equipment.			
Equipment Identification eg Serial Number	Channel Number	Transmit Nominal Freq MHz	Receive Nominal Freq MHz
10	AIS 1 and AIS	161.975MHZ and 162.025MHz	161.975MHZ and 162.025MHz
11	AIS 1 and AIS	161.975MHZ and 162.025MHz	161.975MHZ and 162.025MHz
12	AIS1 and AIS2	161.975MHz and 162.025MHz	161.975MHZ and 162.025MHz

I hereby declare that I am entitled to sign on behalf of the applicant and that the information supplied is correct and complete.

Signature:  Name: Nathan Emery

Position held: Test & Quality Manager Date: 15th February 2011

1.3 BRIEF SUMMARY OF RESULTS

A brief summary of results in accordance with IEC 62287-1 is shown below.

Section	Spec Clause	Test Description	Result	Comments
2.1	5.6.4.1.1	Static accuracy (GPS)	Pass	
2.2	5.6.4.2	Angular movement of the antenna	Pass	
2.3	5.6.4.3.1	Dynamic accuracy (GPS)	Pass	
2.4	5.6.5.1	Acquisition - Condition A - Initialization	N/R	
2.5	5.6.5.2	Acquisition - Condition B - power outage	N/R	
2.6	5.6.5.3	Acquisition - Condition C - Interruption of GPS signals	N/R	
2.7	5.6.5.4	Acquisition - Condition D - Brief interruption of power	N/R	
2.8	5.6.6.1	Protection – Antenna and Input/Output Connections	N/R	
2.9	5.6.8.1	Sensitivity and Dynamic Range – Acquisition	N/R	
2.10	5.6.8.2	Sensitivity and Dynamic Range – Tracking	N/R	
2.11	5.6.10.1	Slow speed update rate	Pass	
2.12	5.6.10.2	High speed update rate	Pass	
2.13	5.6.12.1.1	Failure Warnings and Status Indications (Position/HDOP Alarm Test)	N/A	Deemed Not Applicable due to nature of EUT.
2.14	5.6.13	Accuracy of COG and SOG	See comment	Some failures observed outside of specified observation period. Some initial failures retested and passed with higher SNR.

N/R = Not required (by IEC 62287-1: 2010 Clause 6.3, GNSS receiver for position reporting).

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

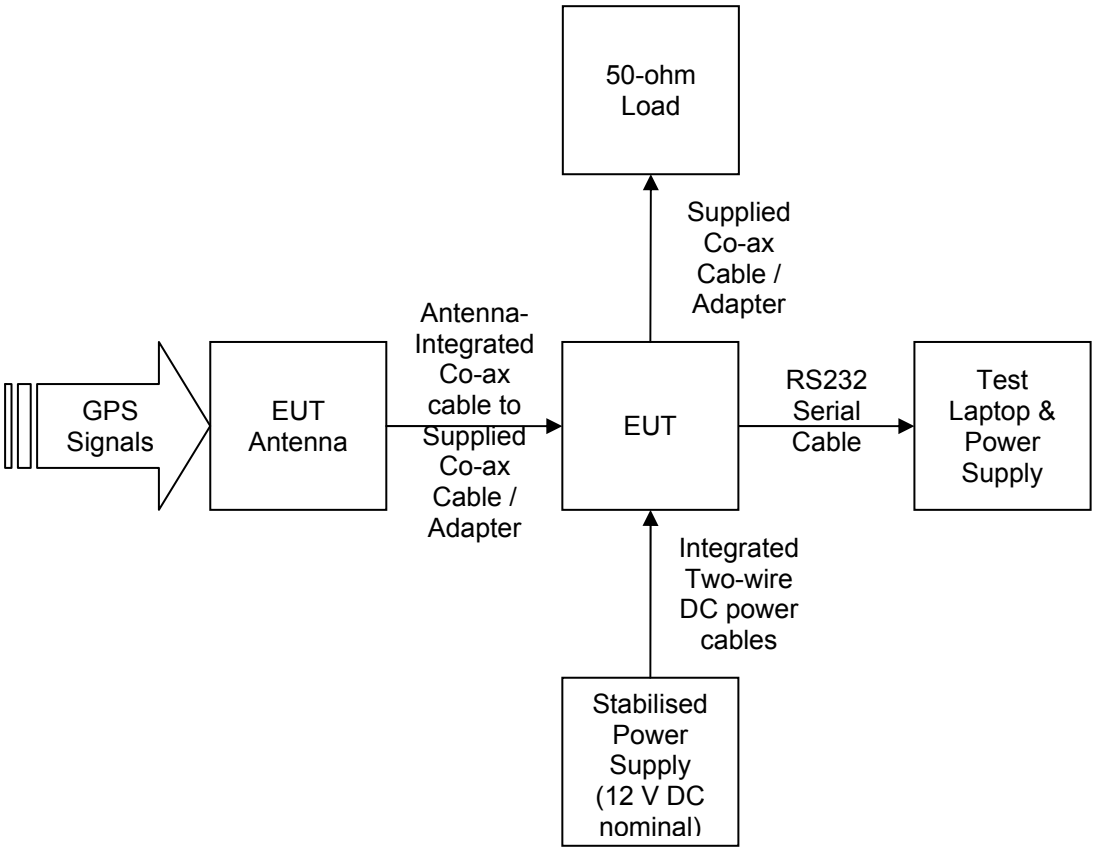
The Equipment Under Test (EUT) was a SRT Marine Technology Ltd Cobalt - Class B AIS as shown in the photograph below. A full technical description can be found in the manufacturer's documentation.

Equipment Under Test

1.4.2 Physical Test Configuration

The EUT was configured as per normal operation with an optional feature enabled, this feature adds GPS receiver data to the serial NMEA 0183 data output.

The feature was enabled via terminal communication at the beginning of every test after EUT activation. EUT de-activation left the feature disabled at next activation.



Test Laptop was either running VisualGPS or Tera Term where sentence output timing was critical. VisualGPS records the NMEA output of the EUT and displays real-time 'translation' of the NMEA data in graphical forms such as satellite views (elevation and azimuth) and SNR levels. Tera Term, a serial terminal program, records the NMEA output of the EUT and adds a timestamp (with a 1 ms resolution) to each sentence.

1.4.3 Modes of Operation

Modes of operation of the EUT during testing were as follows:

Operating:

- Physical configuration as above, EUT entered operational mode upon application of 12 V DC at power input
- Numerous status LEDs of differing colours active in different sequences (LEDs not labelled)
- NMEA 0183 serial data outputting to Test Equipment
- Class B AIS transmitter outputting to 50-ohm loaf

Off/Idle:

- 12 V DC power removed
- EUT displaying no sign of activity

1.5 MODIFICATIONS

No modifications were made to the EUT during testing.

1.6 REPORT MODIFICATION RECORD

Issue 1 – First Issue

Product Service

SECTION 2

TEST DETAILS

Emergency Beacons Limited Testing of the
SRT Marine Technology Ltd
Cobalt - Class B AIS

2.1 PERFORMANCE MONITORING

2.1.1 Performance Checks

IEC 61108-1, Clause 5.3 Standard test signals:

"A "performance check" is defined as a shortened version of the static accuracy test described in 5.6.4.1, i.e. a minimum of 100 position measurements shall be taken over a period of not <5 min and not >10 min, discarding any measurements with HDOP ≥4. The position of the antenna of the EUT shall not be in error compared with the known position by >100 m 95 % using WGS 84 as the reference datum."

Clause 4.3.3.1 Static Accuracy:

"(M.112/A3.4*) The GPS receiver equipment* shall have *static accuracy such that the horizontal position of the antenna is determined to within 100 m (95 %) with horizontal dilution of precision (HDOP) ≤4 (or PDOP ≤ 6)*. Since Selective Availability has been set to zero, the static accuracy has been determined to be within 13 m (95 %) as specified by the GPS SPS Performance Standards of October 2001."

Performance Check Procedure:

For every Performance Check, the following actions were completed:

Action	Reported
EUT provided with GPS signals	Signal Type (Live or Simulated)
EUT powered 'ON'	EUT started simultaneously (Y or N) Note: for Live GPS Signals this is N/A
EUT allowed to acquire valid position	Time to acquire valid position
>100 position measurements recorded (NMEA output)	Measurement duration
Measurement duration noted	Total number of measurements
Measurements with HDOP≥4 discarded	Number of measurements with HDOP ≥ 4 (and PDOP ≥ 6)
Haversine position error calculated for each measurement	N/A
Proportion within tolerance calculated	Measurements with position error ≤ (13) m

[1] The term 'valid position' (also referenced as 'position lock' or 'lock' within this report) is defined as when the NMEA data GGA sentence reports "Position Quality" as any value between 1 and 8. EN 61162:2008 states that "*All GPS quality indicators in headings 1 through 8 are considered "valid". The heading "0" is the only "invalid" indicator.*"

[2] Earth's radius taken as 6367 km

2.2 STATIC ACCURACY (GPS)

2.2.1 Specification Reference

IEC 61108-1, Clause 5.6.4.1.1

2.2.2 Equipment Under Test

Cobalt - Class B AIS, S/N: Not Serialised (TSR0024)

2.2.3 Date of Test and Modification State

14 to 15 February 2011 – Modification State 0

2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.5 Test Setup

Test Set-up

2.2.6 Environmental Conditions

	14 February 2011	15 February 2011
Ambient Temperature:	8.9°C	7.9°C
Relative Humidity:	71%	92%

2.2.7 Test Results

Static Test Site, Clause 5.5.2

"The antenna shall be mounted according to the manufacturer's instructions at a height of between 1 m and 1,5 m above the electrical ground in an area providing clear line of sight to the satellites from zenith through to an angle of +5° above horizontal. The position of the antenna shall be known, with reference to WGS 84 to an accuracy of better than 0,1 m in (x, y, z). Maximum cable lengths as specified by the manufacturer shall be used during testing.

All static tests shall utilize actual GPS signals."

Test Method, Clause 5.6.4.1.1

"Position fix measurements shall be taken over a period of not <24 h. The absolute horizontal position accuracy shall be within 13 m (95 %), having discarded measurements taken in conditions of HDOP ≥ 4 and PDOP ≥6."

Procedure/Results:

EUT was placed on the static test site on a non-conductive platform. It was operated and monitored continuously for the period of measurement as below. Results were as follows:

Test Parameter	Units	Result	Limit
Signal Type	Live/Simulated	Live	-
EUT started simultaneously	Y/N	N/A	-
Time to acquire valid position	s	N/A	-
Total number of measurements	-	88337	-
Number of measurements with HDOP ≥ 4 and PDOP ≥6	-	88337	> 100
Measurement duration	h	24.54	> 24
Measurements with position error ≤ 13 m	%	100	≥ 95

Limits Clause 4.3.3.1

"(M.112/A3.4) *The GPS receiver equipment* shall *have static accuracy such that the horizontal position of the antenna is determined to within 100 m (95 %) with horizontal dilution of precision (HDOP) ≤4 (or PDOP ≤ 6).* Since Selective Availability has been set to zero, the static accuracy has been determined to be within 13 m (95 %) as specified by the GPS SPS Performance Standards of October 2001."

2.3 ANGULAR MOVEMENT OF THE ANTENNA

2.3.1 Specification Reference

IEC 61108-1, Clause 5.6.4.2

2.3.2 Equipment Under Test

Cobalt - Class B AIS, S/N: Not Serialised (TSR0024)

2.3.3 Date of Test and Modification State

15 and 16 February 2011 - Modification State 0

2.3.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.5 Test Setup

Test Setup (Angular Movement Extreme 1)

Test Setup (Angular Movement Extreme 2)

2.3.6 Environmental Conditions

	15 February 2011	16 February 2011
Ambient Temperature:	7.9°C	7.1°C
Relative Humidity:	92%	73%

2.3.7 Test Results

Test Method Clause 5.6.4.2:

"The static tests specified in 5.6.4.1.1 and 5.6.4.1.2 shall be repeated with the antenna performing an angular displacement of ±22,5° (simulating roll) in a period of about 8 s (see IEC 60721-3-6) during the duration of the tests.

The results shall be as in 5.6.4.1.1 and 5.6.4.1.2."

Procedure/Results:

EUT was placed on the static test site on a non-conductive platform oscillating ±22.5° from the vertical with a period of approximately 8 seconds. It was operated and monitored continuously for the period of measurement as below. Results were as follows:

Test Parameter	Units	Result	Limit
Signal Type	Live/Simulated	Live	-
EUT started simultaneously	Y/N	N/A	-
Time to acquire valid position	s	N/A	-
Total number of measurements	-	86579	-
Number of measurements with HDOP ≥ 4 and PDOP ≥6	-	86579	> 100
Measurement duration	h	24.17	> 24
Measurements with position error ≤ 13 m	%	100	≥ 95

Limits Clause 4.3.3.1

"(M.112/A3.4) *The GPS receiver equipment* shall *have static accuracy such that the horizontal position of the antenna is determined to within 100 m (95 %) with horizontal dilution of precision (HDOP) ≤4 (or PDOP ≤ 6).* Since Selective Availability has been set to zero, the static accuracy has been determined to be within 13 m (95 %) as specified by the GPS SPS Performance Standards of October 2001."

2.4 DYNAMIC ACCURACY (GPS)

2.4.1 Specification Reference

IEC 61108-1, Clause 5.6.4.3.1

2.4.2 Equipment Under Test

Cobalt - Class B AIS, S/N: Not Serialised (TSR0024)

2.4.3 Date of Test and Modification State

11 March 2011 – Modification State 0

2.4.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.5 Environmental Conditions

Ambient Temperature:	22.2°C
Relative Humidity:	33%

2.4.6 Test Results

Test Method Clause 5.6.4.3.1:

"The tests for dynamic accuracy are a practical interpretation of the conditions set out in IEC 60721-3-6, Table V, item e), X – direction (surge) and Y – direction (sway). These are stated as surge 5 m/s^2 and sway 6 m/s^2 for all classes of environment. When using a simulator, the simulator characteristics shall accurately represent the signals required.

The results of the test performed by simulation facilities shall be identical with those in a) and b) below. *[…]*

a) a fully locked and settled EUT travelling in a straight line at 48 knots ± 2 knots for a minimum of 1,2 min which is reduced to 0 knots in the same straight line in 5 s […]

b) a fully locked and settled EUT travelling at least 100 m at 24 knots ± 1 knot in a straight line then subjected, for at least 2 min, to smooth deviations either side of the straight line of approximately 2 m at a period of 11 s to 12 s[…]"

Procedure/Results - Dynamic Accuracy A:

EUT and GPS simulator were started simultaneously and the EUT acquired a position lock after the acquisition time stated in the table below; the simulator ran a dynamic position travelling at 48 knots in a straight line for 10 minutes before decelerating to 0 knots in 5 seconds (in the same straight line). The position output 10 seconds after coming to rest was determined from the NMEA 0183 output. A Performance Check was then performed for information.

Test Parameter	Units	Result	Limit
Initial Acquisition Time	s	48.911	-
Position Error 10 s after coming to rest	m	6.67	< 13
Performance Check			
Signal Type	Live/Simulated	Simulated	-
EUT started simultaneously	Y/N	Y	-
Time to acquire valid position	s	N/A	-
Total number of measurements	-	304	-
Number of measurements with HDOP ≥ 4 and PDOP ≥6	-	304	> 100
Measurement duration	min	5.05	> 5 and < 10
Measurements with position error ≤ 13 m	%	100	≥ 95

Procedure/Results - Dynamic Accuracy B:

EUT and GPS simulator were started simultaneously and the EUT acquired a position lock after the acquisition time stated in the table below; the simulator ran a dynamic position travelling at 24 knots in a straight line for 10 minutes before starting to oscillate smoothly ±2 m either side of the original path for a further 20 minutes.

EUT position output error compared to the simulated dynamic position was determined from the EUT NMEA output.

A Performance Check was conducted during the 20-minute oscillation period in order to determine that the position error was not outside of the ±30 m 'lane' of tolerance.

Test Parameter	Units	Result	Limit
Initial Acquisition Time	s	78.89	-
Performance Check			
Signal Type	Live/Simulated	Simulated	-
EUT started simultaneously	Y/N	Y	-
Time to acquire valid position	s	N/A	-
Total number of measurements	-	1201	-
Number of measurements with HDOP ≥ 4 and PDOP ≥6	-	1201	> 100
Measurement duration	min	20.00	-
Measurements with position error ≤ **30 m**	%	100	≥ 95

Limits Clause 5.6.4.3.1 (Test Method Clause)

"a) […] shall not indicate a positional offset >±13 m from the final position 10 s after coming to rest;

b) […] shall remain in lock and follow the actual position to within a lane of 30 m wide centred on the mean direction of motion."

2.5 SLOW SPEED UPDATE RATE

2.5.1 Specification Reference

IEC 61108-1, Clause 5.6.10.1

2.5.2 Equipment Under Test

Cobalt - Class B AIS, S/N: Not Serialised (TSR0024)

2.5.3 Date of Test and Modification State

28 March 2011 – Modification State 0

2.5.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.5.5 Environmental Conditions

Ambient Temperature:	22.9 °C
Relative Humidity:	26%

2.5.6 Test Results

EUT was locked and settled on a static simulated position; the simulated scenario then began a period of motion at 5 knots ±1 knot. During a 10-minute period of observation, the time between position output messages and time between position updates was checked. Maximum values are recorded in the table below.

To confirm the minimum resolution of position, the GGA sentence of the NMEA 0183 output was inspected for the Latitude and Longitude field values (see table below), in the format *DDMM.X* and *DDDMM.X* respectively. Where *D* is degrees, *M* is minutes and *X* is decimal places of minutes.

A Performance Check was carried out during the 10-minute observation period to confirm that the received positions complied with the simulated position.

Test Parameter	Units	Result	Limit
Minimum position change (min[dLat+dLon])	Decimal degrees	3.5×10^{-05}	> 0
Maximum position update interval	s	1.047	≤ 10
Sample latitude field value	Min	5051.01697	Resolution must be to 0.001
Sample longitude field value	Min	00108.52098	Resolution must be to 0.001
Performance Check			
Signal type	Live/Simulated	Simulated	-
EUT started simultaneously	Y/N	Y	-
Time to acquire valid position	s	N/A	-
Total number of measurements	-	599	-
Number of measurements with HDOP ≥ 4 and PDOP ≥ 6	-	599	> 100
Measurement duration	min	10.00	> 5 and < 10
Measurements with position error ≤ 13 m *	%	100	≥ 95

* Position error relative to the instantaneous position

2.6 HIGH SPEED UPDATE RATE

2.6.1 Specification Reference

IEC 61108-1, Clause 5.6.10.2

2.6.2 Equipment Under Test

Cobalt - Class B AIS, S/N: Not Serialised (TSR0024)

2.6.3 Date of Test and Modification State

28 March 2011 – Modification State 0

2.6.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.6.5 Environmental Conditions

Ambient Temperature: 21.5 °C
Relative Humidity: 28 %

2.6.6 Test Results

Deviation from the Test Method Clause

A simulator was used to perform this test; however, EUT output was at 1-second intervals, not 0.5 s as required (or “recommended” as per Clause 4.3.9).

Results

EUT was locked and settled on a scenario simulating motion at 70 knots. During a 10-minute period of observation, the time between position output messages and time between position updates was checked. Maximum values are recorded in the table below.

To confirm the minimum resolution of position, the GGA sentence of the NMEA 0183 output was inspected for the Latitude and Longitude field values (see table below), in the format *DDMM.X* and *DDDMM.X* respectively. Where *D* is degrees, *M* is minutes and *X* is decimal places of minutes.

A Performance Check was carried out during the 10-minute observation period to confirm that the received positions complied with the simulated position.

Test Parameter	Units	Result	Limit
Minimum position change (min[dLat+dLon])	Decimal degrees	5.12×10^{-04}	> 0
Maximum position update interval	s	1.016	≤ 1
Sample latitude field value	min	5052.99675	Resolution must be to 0.001
Sample longitude field value	min	00121.95793	Resolution must be to 0.001
Performance Check			
Signal type	Live/Simulated	Simulated	-
EUT started simultaneously	Y/N	Y	-
Time to acquire valid position	s	N/A	-
Total number of measurements	-	601	-
Number of measurements with HDOP ≥ 4 and PDOP ≥ 6	-	601	> 100
Measurement duration	min	10.00	> 5 and < 10
Measurements with position error ≤ 13 m *	%	100	≥ 95

2.7 FAILURE WARNINGS AND STATUS INDICATIONS (POSITION/HDOP ALARM TEST)

2.7.1 Specification Reference

IEC 61108-1, Clause 5.6.12.1.1

2.7.2 Date of Test and Modification State

30 March 2011 – Modification State 0

2.7.3 Test Results

Analysis of the test clause indicates that the test is applicable to EUTs taking the NMEA data and displaying it, for example a chart plotter. The test was deemed 'Not Applicable' because the EUT does not display the data, or other data based on the NMEA data stream (rather, it merely 'forwards' the NMEA data onto other systems via the serial connection). EUT AIS output validity/alarms should be tested/verified to the relevant part(s) of IEC 62287-1: 2010.

2.8 ACCURACY OF COG AND SOG

2.8.1 Specification Reference

IEC 61108-1, Clause 5.6.13

2.8.2 Equipment Under Test

Cobalt - Class B AIS, S/N: Not Serialised (TSR0024)

2.8.3 Date of Test and Modification State

14 & 22 March 2011 – Modification State 0

2.8.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.8.5 Environmental Conditions

	14 March 2011	22 March 2011
Ambient Temperature:	21.5 °C	22.5 °C
Relative Humidity:	28 %	31 %

2.8.6 Test Results

Test Method Clause 5.6.13 – Accuracy of COG and SOG

"The EUT shall be set up on an appropriate mobile unit or simulator and all outputs indicating course over ground shall be monitored.

At a constant forward direction, the forward speed shall be within 0 knots to 1 knot. Ten seconds after being in the range, measurements shall be made for a duration of 2 min. This cycle shall be repeated for all speed ranges of the Table 2 above."

NB: The interpretation of "being in the range" was that the GGA sentence indicated lock and the applied speed was steady.

Accuracy of COG and SOG

EUT was locked and settled on a scenario simulating motion at the speed indicated in the test tables below. During a 2-minute period of observation the COG and SOG were checked (in the VTG sentence) against the requirements and are recorded in the tables below.

Accuracy of COG and SOG: 0-1 knots

Test Parameter	Units	Result	Limit
Course over Ground	° (True)	N/A	-
Speed	knots	0.000	0 to ≤ 1
Max COG Error	° (True)	All Null	All fields should be Null
Max SOG Error	knots	0.164	0.2

Note: a fail result was observed outside the 2-minute measurement period, at approximately 2:11. A total of 12 reported values were out of tolerance in a 15 minute period immediately following the 2-minute test window.

Accuracy of COG and SOG: 1-17 knots (First test)

Test Parameter	Units	Result	Limit
Course over Ground	° (True)	90.00	-
Speed	knots	4.860	1 to ≤ 17
Max COG Error	° (True)	1.58	3
Max SOG Error	knots	0.584*	0.2

* 5 total results in excess of 0.2

Signal to Noise Ratios for each satellite used in the position solution were approximately 30 dB.

The test was repeated once and the result was confirmed. The test was repeated a second time with a better SNR (achieved by increasing the simulated signal strength), results follow.

Accuracy of COG and SOG: 1-17 knots (Higher SNR Retest)

Test Parameter	Units	Result	Limit
Course over Ground	° (True)	90.00	-
Speed	knots	4.860	1 to ≤ 17
Max COG Error	° (True)	0.49	3
Max SOG Error	Knots	0.054	0.2

Signal to Noise Ratios for each satellite used in the position solution were approximately 48 dB to 49 dB.

Accuracy of COG and SOG: 17+ knots

Test Parameter	Units	Result	Limit
Course over Ground	° (True)	90.00	-
Speed	knots	19.438	> 17
Max COG Error	° (True)	0.78	1
Max SOG Error	Knots	0.304	0.389

Validity of COG and SOG

At the end of the 17+ knots test, the satellite signals were removed, one SV at a time, until only two remained (insufficient for a position lock). The GGA and VTG validity flags were observed to turn to invalid and the COG and SOG fields were observed to all be null (including the True/Magnetic/Unit indicators).

SECTION 3

TEST EQUIPMENT USED

3.1 TEST EQUIPMENT

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.2 Beacons - GPS Static Accuracy					
Power Supply Unit	Farnell	LT-30-2	41	-	O/P Mon
Multimeter	Iso-tech	IDM101	2421	12	26-Oct-2011
Stop Clock	R.S Components	RS328 061	2674	-	TU
Inclinometer	FISCO	EN 17	3223	12	24-Dec-2011
Humidity and Temperature Meter	R.S Components	1361C	3844	12	7-Feb-2012
Section 2.3 Beacons - GPS Angular Movement of the Antenna					
Power Supply Unit	Farnell	LT-30-2	41	-	O/P Mon
Multimeter	Iso-tech	IDM101	2421	12	26-Oct-2011
Stop Clock	R.S Components	RS328 061	2674	-	TU
Inclinometer	FISCO	EN 17	3223	12	24-Dec-2011
Humidity and Temperature Meter	R.S Components	1361C	3844	12	7-Feb-2012
Section 2.4 Beacons - GPS Dynamic Accuracy					
Power Supply Unit	Farnell	LT-30-2	41	-	O/P Mon
Attenuator 10dB/10W)	Trilithic	HFP-50N	454	12	21-Jul-2011
Attenuator: 6dB/10W	Trilithic	HFP-50N	476	12	21-Jul-2011
Multimeter	Iso-tech	IDM101	2421	12	26-Oct-2011
GPS/SBAS Simulator	Spirent	STR4500	3056	-	TU
Hygrometer	Rotronic	I-1000	3068	12	10-Jul-2011
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3159	12	10-Jun-2011
Cable (1m, N Type)	Rhophase	NPS-1601-1000-NPS	3354	12	20-Apr-2011
Section 2.5, 2.6 and 2.8 Beacons - GPS Position Update & Accuracy of COG and SOG					
Power Supply Unit	Farnell	LT-30-2	41	-	O/P Mon
Attenuator 10dB/10W)	Trilithic	HFP-50N	454	12	21-Jul-2011
Attenuator (10dB, 10W)	Texscan	HFP-50N	468	12	23-Jun-2011
Attenuator: 6dB/10W	Trilithic	HFP-50N	476	12	21-Jul-2011
Multimeter	Iso-tech	IDM101	2421	12	26-Oct-2011
GPS/SBAS Simulator	Spirent	STR4500	3056	-	TU
Hygrometer	Rotronic	I-1000	3068	12	10-Jul-2011
Termination (50ohm, 15W)	Diamond Antenna	DL-30N	3098	12	7-Mar-2012
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3159	12	10-Jun-2011
Cable (1m, N Type)	Rhophase	NPS-1601-1000-NPS	3354	12	20-Apr-2011

Note: No Test Equipment was used for sections 2.1 and 2.7 as these were completed by analysis of available information.

TU – Traceability Unscheduled
O/P MON – Output Monitored with Calibrated Equipment

SECTION 4

DISCLAIMERS AND COPYRIGHT

4.1 DISCLAIMERS AND COPYRIGHT

This report relates only to the actual item/items tested.